

Exhibit K

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems TTY/TDD FORUM - 13

DRAFT .01

(November 19, 1999)

November 18, 1999

BWI Marriott

Baltimore, MD

1. CALL TO ORDER, INTRODUCTIONS AND ATTENDANCE ROSTER

Todd Lantor, co-chair, PCIA, and Brad Blanken, CTIA, called the meeting to order, introductions were made, and the attendance roster was circulated.

2. CALL FOR AND NUMBERING OF CONTRIBUTIONS

Contributions were submitted and numbered as follows:

| Number | Document | Agenda # |
|------------------------|--------------------------------|----------|
| TTY Forum/99.11.18.01 | Agenda | 1 |
| TTY Forum/99. 11.18.02 | iDEN presentation by Motorola | 7 |
| TTY Forum/99. 11.18.03 | Test data status report | 11 |
| TTY Forum/99. 11.18.04 | Consumer Update e-mail | 6 |
| TTY Forum/99. 11.18.05 | 3Com and Motorola presentation | 10 |
| TTY Forum/99. 11.18.06 | Meeting roster | 1 |

3. REVIEW & APPROVE AGENDA

The agenda was distributed

4. REVIEW & APPROVE TTY FORUM – 12 SUMMARY

No corrections were noted. Any comments or corrections can be addressed to Todd Lantor or Ed Hall via e-mail.

5. TTY LIAISON REPORTS: FCC, CTIA/PCIA, NAD, TDI

Todd Lantor announced that Karen Straus has moved from her post at NAD to join the FCC as Deputy Director.

Marty Lieberman did not have any updates from the FCC at this time.

Todd Lantor noted that the TTY Status update had been completed and submitted to the FCC and the industry to chronicle the activities and advancements made by the TTY Forum over the last year. Meetings will be held with the FCC in the next several weeks. Todd Lantor, PCIA, asked that any information that consumers or the industry would like to be conveyed to the FCC

should contact him or Ed Hall, CTIA, to have the information included in the presentations.

6. CORRESPONDENCE

Judy Harkin, Gallaudet, reported on her memo summarizing the consumer requirements update after the presentations in September to identify possible concerns, particularly related to roaming and roaming with various air interfaces. Judy offered that Todd Lantor can distribute the memo to the group.

Todd Lantor asked that Steve Coston, Ericsson, update the group on the activities that Ericsson has been pursuing on their TTY solution. Steve stated that the air interface technologies are attempting to make a single choice for a solution. Ericsson feels that it is important for the group to have all the information regarding the particular solutions and that the FCC is privy to all the information as well. Steve is available to answer any questions that may arise from the reading of the TTY report. The September meeting allowed increased understanding of the Ericsson solution. Ericsson would like to advance past the simulation level to provide a "PC based" demo to bring to the meeting.

7. TECHNICAL STANDARDS ACTIVITIES

Todd Lantor read the e-mail from Ed Hall regarding his presentation to the T1P1 and an update of the status of TTY issues as they relate to expeditiously select a single solution for TTY over GSM networks. The decision-making process may have an international impact and therefore will require a longer process than the CDMA and TDMA standards making processes. Ed Hall states that he remains highly confident that the T1P1 group is dedicated to finding a solution in the shortest period of time.

Steve Manneta, OmniPoint, added that T1P1 has made an immediate response to the request from the GSM users group asking for help on choosing a solution by putting the issue on the calendar for this week. The issue is being seriously

worked but Steve wants to add that the issue must go through the European community which takes longer but is being expedited.

TDMA reported that TR45.3 has adopted a resolution to IS 843.

CDMA has moved forward with their Lucent solution and is expediting their activities.

8. VOICE BASED SOLUTIONS (Formerly "short term")

Audrey Longhurst, Motorola, presented the iDEN TTY solution for the iDEN air interface which is used by NEXTEL and Southern Linc. iDEN leverages GSM but uses a different air interface requiring a different TTY solution. The iDEN solution will meet the consumer requirements and will support VCO/HCO (an audio accessory will be required if the TTY device doesn't have a speaker and microphone). The solution will support 45.45 baud only. ANI and ALI will be provided for TTY calls. The solution will not require two-stage dialing. A 2.5 mm cable will be required and supplementary services (Call Hold, Call Forwarding, etc.) will be available where available for voice calls.

Al Sonnestrhal asked whether the system is between a voice user and a TTY user or a TTY to TTY?

Answer: The path is the voice path but there is no assumption of a voice at the other end. A TTY to TTY will be accommodated automatically.

Marty Lieberman, FCC, asked if there is anything that the Lucent solution, with regard to iDEN, does not provide. Audrey stated that there was nothing to her knowledge.

Dick Brandt, Gallaudet, stated that the frequency shift keying is out for ballot currently. Dick Brandt updated stated that the physical aspects of the 2.5 mm jack are being pursued and Dick will reference this in his standards work. The electrical standards are clearly defined and do not need further definition, only consolidation in a TSB.

An e-mail was read from Steve Benno, Lucent, stating that Lucent has decided to distribute the TTY solution, royalty-free, to all using the solution. The Lucent

solution will be available free of charge and is projected to be available in the spring of 2001. Lucent noted that it is not relinquishing the patent rights, just making the solution available royalty-free.

9. REVIEW/UPDATE APPENDIX D - *Test Completion Matrix*

A contribution was received this morning from Mitsubishi on testing that was completed January, 1999 and Brad Blanken will add this to Appendix D. No one from Mitsubishi is present to offer more information so Brad will make the document available to the TTY Forum for review.

10. DATA SOLUTION (FORMERLY "LONG TERM")

Ben Cardwell, 3Com, and Tom Weiss, Motorola, presented a data solution for TTY over CDMA. V.18 support was originally included as an optional feature in IS-99 (the original specification for CDMA) and is now IS-707-A. 3Com and Motorola collaborated to bring this feature to market by year end 1999. This work began prior to the promises of a vocoder solution being viable.

The solution uses AT commands and serial data are used to control a modem in the interworking function, which resides in the CDMA infrastructure. The solution offers an option to support several client devices. The IWF receives raw data and is designed to automatically detect a TTY device and works fully digitally. It supports 45.45 baud, V.21 and Bell 103. It cannot support a standard TTY device on the mobile end.

Some advantages of the solution: it is quickly deployable, simple software update, TTY compatible software will be available from 3Com by the end of 1999. It is designed to interface with all Lucent, Motorola, Nortel networks. The same model can be used for TDMA and GSM with simple protocol changes.

Dick Brandt asked if there is support of V.8 or V.8 based. The 3Com answered that it is available but no TTY devices use V.8. Dick noted that future TTYs will

move to V.18 and that requires V.8 capability. 3Com can use a command to detect V.8 and also can auto-detect V.18. Judy Harkin noted that the matrix comparing data and vocoder solutions was less generous to the data solution since the volume control was not applicable and a wireless retrofit was acceptable.

Wireless user to wireless user is in effect today via text-based interface. Judy Harkin asked about the call progress indications. Motorola stated that the same call progress information was available as in a voice call – connect, progress and disconnect information. Dialing information is also available – dialing, connect, busy, etc. Circuit 135 is looking at power on the line – i.e. a flashing red light to tell whether the answer is a voice, answering machine, etc which is important to a deaf user. Motorola stated that it is a limitation on the data side because the call is transmitted as data. Dick noted that one of the supported issues is Circuit 135 and was in the original spec so Dick believes it may be supported in this environment. Motorola will check into this with standards but did not have this issue as their focus.

Q. Is there a distinguishable difference between a TTY IWF call and a normal IWF call? **Answer:** to the switch it looks like a normal call but the call log will identify call as voice or TTY. A carrier who has this analysis available can make this available in their statistics servers and metrics servers.

Q. What is the functional effect on the user of receiving a call of this type? **Q.** Do you know whether you are receiving a phone call vs. an e-mail? **Answer:** You could get a short message on a cell phone using short messaging service. But you have to have a pre-arranged signal to be able to attach a TTY. Brad Blanken clarified that this is not a simple answer since it matters what equipment you are using. If you are using a laptop you would have to be set up in advance. The system knows that a data call is being placed to a mobile phone. If you were quick enough you could theoretically plug your computer into the phone. Judy Harkin wanted to clarify if the deaf person would know they were getting a voice or data call. **Q.** Al Sonnesthal asked if the voice call takes the same amount of

time to place as a normal voice call to 9-1-1? Answer: A modem connection adds 10-15 seconds whether on a landline or a wireless line. The wireless environment could add 2 seconds.

How does the user know which mode the call is going to be forced into. Answer: It will be forced to 5 bit Baudot first, then look for other protocols to complete the call. Dick Brandt pointed out that the 9-1-1 call will have delay on the answering end because it will be initially answered as a silent call and then moved to a TTY protocol.

Al Sonnestrhal added that the call takers are trained to listen for sounds in the background before transferring to a TTY call. Dick Brandt would like to know how long the modem holds before switching to the next protocol.

3Com will take that question as a follow up question. Dick Brandt recommended that since most modems can detect voice and that the system should be set to go into a holding pattern if it detects voice.

Q. Al asked if there is a way to show the difference between voice or data?

Answer: On a data line the call would indicate with a word "busy" on the phone. A data call would not complete if a line is not active or there is no modem on the other end of the line.

Brad Blanken clarified with a comparison to the internet which give written feedback that there is no carrier or answer at the site.

Al pointed out that it takes several seconds for the feedback to pop up. Is there a way to make that faster?

Answer: Forcing the V.18 command would make it faster.

Dick Brandt added that if this device supported Circuit 135 this issue would be resolved.

Tom Weiss further discussed the user requirements as they relate to using a RS232. Currently no TTY supports RS232 or this solution on the wireless side.

Ron Shchultz, UltraTEc, agreed that there are no TTYs to his knowledge that supports RS232 and was not able to comment on whether any plans exist to include this feature in the future.

Issues that exist for the data solution are: the non-provisioned handset support, latency, and 2-stage dialing for call back, and non-support for HCO/VCO.

Dick Brandt added that the best way to accommodate this solution would be to equip TTYs with the RS232 device so the cabling is simple. 2 stage dialing is a concern but a better answer is that 2 stage dialing may be required depending on the network setup.

The tests were run on 5 or 6 of the most popular TTYs available.

The presenters thanked the audience for their feedback and will work on the issues raised.

11. TTY TECHNICAL STATUS REPORT FORMAT

After providing opportunity for the Forum members to read the document, the floor was opened to discussion.

- Panasonic corrected the standard number in the TDMA section to IS-823.
- 13k vocoder on CDMA is noted as a correction.
- Page 7 paragraph 3.1.1 - addition: PN-4558, and after "vehicle interface standards" add IS-789A, add 2nd time to end of sentence.

12. ANALOG/TTY CAPABLE PHONE LIST

Brad Blanken, CTIA, produced a list of all compatible equipment supporting Section 255. CTIA does not have the resources to maintain the list but offers the ability to template and supply links to all manufacturer and carrier web-sites.

Discussion was encouraged on the carrier/manufacturer willingness to assist.

Jim from TDI made the comment that many organizations are interested in this information and wants a web-site address to be advertised to the consumers.

CAN and SHHH both feel that they could help with consumer understanding of the issues related to compatibility. The question was raised as to the best location to disseminate the information to the consumer. Jim, TDI, would like the

ATTENDANCE

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|-------------------------|-------------------------|-----------------------|--------------|-------------------------------------|
| Blanken, Brad | CTIA | 202-736-3636 | 202-466-7239 | Bblanken@ctia.org |
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| Brooner, Mary | Motorola | 202-371-6900 | 202-842-3578 | Amb004@email.m ot.com |
| Brandt, Richard | Gallaudet University | 908-735-6171 | 215-790-3208 | Brandt@gallaudet. edu |
| Coleman, Randy | CTIA | 202-736-3256 | 202-785-8203 | Rcoleman@ctia.or g |
| Coston, Steven | Ericsson | 919-472-7527 | 919-472-6612 | Steve.coston@eric sson.com |
| Dunne, Toni | TX 9-1-1 Comm | 512-305- 6918V/TTY | 512-305-6937 | tdd@earthlink.net |
| Fontes, Brian | CTIA | 202-736-3216 | 202-785-8203 | Bfontes@ctia.org |
| Green, Kendra | NEC America | 972-518-5379 | 972-518-5380 | Greenk@ccgakidl. nec.com |
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| Liebman, Marty | FCC | 202-418-0633 | | MLiebman@fcc.gov |
| Neeley, Doug | Nokia | 972-894-5782 | 972-894-5782 | Doug.neeley@yah oo.com |
| Parker, Virginia | Qualcomm Inc. | 619-658-4789 | 619-651-8962 | vparker@qualcom m.com |
| Peltz-Strauss, Karen | NAD | 301-587-7466 | 301-587-1234 | kpstrauss@aol.co m |
| Schultz, Ron | Ultratec | 608-238-5400 | 608-238-3008 | Rschultz@ultratec. com |
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| Thomas, Al | Bellsouth Cellular | 404-713-0361 | 404-713-0361 | Al.thomas@bscc.bl s.com |
| Uzuanis, Richard | HITEC | 630-654-9200 | 630-654-9219 | Richard@hitec.co m |
| Wells, Ken | Philips Con. Comm | 732-878-8436 | 732-463-6868 | Kwells@pcc.lucent .com |
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Exhibit L

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems

TTY/TDD FORUM - 14

DRAFT .01

(April 5, 2000)

**April 5, 2000
Gallaudet Univ
Washington, DC**

1. CALL TO ORDER, INTRODUCTIONS AND ATTENDANCE ROSTER

Todd Lantor, PCIA, and Ed Hall, CTIA called the meeting to order, introductions were made and attendance roster was circulated

2. CALL FOR AND NUMBERING OF CONTRIBUTIONS

Contributions were submitted and numbered as follows:

| Number | Document | Agenda # |
|-----------------------|-----------------------------------------------------------------|----------|
| TTY Forum/00.04.05.02 | Draft meeting summary | 4 |
| TTY Forum/00.04.05.03 | Report of the TIP1 TTY ad hoc | 8 |
| TTY Forum/00.04.05.04 | BAM Digital Cellular Service for Hearing and Speech Impaired | 6 |
| TTY Forum/00.04.05.05 | TTY Smart Cable | 9 |
| TTY Forum/00.04.05.06 | Signal Adaptation Module | 8 |
| TTY Forum/00.04.05.07 | Description for Global Text Telephony | 6 |
| TTY Forum/00.04.05.08 | Letter from Ericsson | 6 |
| TTY Forum/00.04.05.09 | Gregg C. Vanderheiden Ph.D. | 8 |
| TTY Forum/00.04.05.10 | Qualcomm report of V.18 feature | 9 |

3. REVIEW & APPROVE AGENDA

The agenda was distributed

4. REVIEW & APPROVE TTY FORUM-14 SUMMARY

No corrections were noted. Any comments or corrections can be addressed to Todd Lantor or Ed Hall via e-mail.

5. TTY LIASON REPORTS: FCC, CTIA/PCIA, NAD, TDI

FCC- Marty Leibman, Wireless Bureau will be putting out a notice that will be seeking comments from consumers, manufactures, and carriers concerning TTY

NAD- Not enough representative for the meeting

CTIA-

PCIA- Todd Lantor had no report at this time

TDI- TR30 report will be published but the release date is still in question.

6. CORRESPONDENCE

Ed Hall, CTIA, distributed the contribution by Bell Atlantic Mobile. A silent review of the document was conducted; there were no representatives from Bell Atlantic to discuss the contribution.

Steve Coston, Ericsson, updated the group on the cover letter stating that Ericsson will offer non-exclusive, royalty-free licenses under Ericsson patents for all TTY users. There were no questions for Steve Coston.

Steve Coston, Ericsson, discussed Ericsson's work item concerning the development of global text telephony, which supports real text time conversation fulfilling the FCC requirements. The text telephony was received and accepted and will have a TSG number assigned. Steve was asked whether or not the text telephony will be related to 3GPP; Steve replied that it was technology neutral and will support TTY devices.

7. TECHNICAL STANDARDS ACTIVITIES UPDATE (CDMA, TDMA, Iden, GSM)

Agreement reached to create Appendix J to track Standards developments.

8. VOICED BASED SOLUTIONS (FORMERLY SHORT TERM)

Bob Hall, Chair of GSM T1P1.5, gave a report on the decision made at the interim meeting, addressing TTY. The main item discussed was looking for a solution to the FCC mandate through an international aspect. They agreed to use the 2.5mm auto jack, they are also looking to put out a TSB, creates a greater possibility for a smart cable to be implemented in a shorter time. T1P1.5 made the decision to use Ericsson's mobile solution, which includes the TTY detector and modem.

Issues remaining from the T1P1.5 meeting are: complexity needs to be down, timing issues, and delay impacts of solution. Voice Carry Over (VCO) was addressed and a solution was met, there will be a report addressing the related item. The AMR code gives you a better sound base. Rather than altering the Kodak we will put something in front of it. Tandy Free Operations (TFO) makes sure that there is a modem on the other side.

T1P1.5 is looking to make TTY part of 3GPP, which makes it part of GSM

The working plan for T1P1.5 includes an overview of the modem and the code of the modem, which will take place of May 17, 2000. Hard copies will be available and will be posted on the web by May 25. The web address is www.t1.org. A point was brought up from the group for the plan to be posted on the list serve. Ed Hall, CTIA, will have the necessary documents to be posted on the site. The key word is TTY

Judy Harkin, Gallaudet, brought up the point to not just look at 911 for delay but for all voice calls in the T1P1 standard. She believes that the issues need to be addressed more carefully. Bob Hall, T1P1.5, addressed the issue and they agreed to be more sensitive. Steve Coston, agreed to bring it up in his next meeting.

The next meeting of the T1P1.5 will be held on May 8-12. There will be a contribution from T1P1.5 to the 3GPP meeting, June 5-9, making sure the Kodak people will be aware of the Ericsson solution.

Q: How does 3GPP plan to support TTY?

A: TTY has met some resistance from 3GPP, T1P1.5 is looking to have them support the Kodak and also looking at 3GPP2.

Q: Will T1P1 be using the same standard or a different standard in the phone?

A: The standard will tell you if you need a smart cable or not. T1P1 wants the integration to come ASAP, looking to have a network solution.

Steve Coston, Ericsson, addressed the forum about their Signal Adaptation Module (SAM). Mr. Coston told the group that the solution should focus on the integration of the cable into the phone. Ericsson's SAM not only meets the requirements of the FCC but also serves as a solution for GSM. By using the SAM detector in the modem, it has the ability to detect and modulate the transfer into digital bits. The solution requires modification at the terminal side and at the base station level. The flexibility of adapting modem protocol into the base station provides a higher degree of error correction. The solution connects through a 2.5mm cable auto jack.

Q: Is the call any different than any regular call?

A: No, it will come the same way. The focus is on the vocoder. We will not alter the vocoder, but put something in front of it.

Q: If there was not a mobile out there, what will occur?

A: The handshake will not occur.

Q: Do they have both technologies working?

A: It is expected that both Lucent and Ericsson will be working simultaneously for CDMA, TDMA, GSM, and AMPS.

Steven Coston, Ericsson, stated that SAM meets all the 13 requirements implemented by the FCC. The solution supports both Voice Carry Over (VCO) and Hearing Carry Over (HCO). He also stated that if there were no handshake occurring between the terminal and base station, the tones would pass straight through. After recognition from modem, the handshake will start assuming that there is

Exhibit M

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems

TTY/TDD FORUM - 15

DRAFT .01

(July 11, 2000)

**July 11, 2000
BWI Marriott
Baltimore, MD**

1. CALL TO ORDER, INTRODUCTIONS AND ATTENDANCE ROSTER

Todd Lantor, PCIA, and Ed Hall, ATIS called the meeting to order, introductions were made and attendance roster was circulated.

Ed Hall noted that he has left CTIA as AVP of Technology and Network Ops and is now working for ATIS as the VP of Technology Development. He noted he intends to continue working as co-chair for this committee and offered to let the TTY Forum discuss his intention to stay as co-chair. CTIA noted that now that ATIS is working with this committee, CTIA will continue to work with the TTY Forum. CTIA noted that they felt it was best to allow Ed Hall to continue as the co-chair with ATIS providing administrative support. There were no other objections or discussions.

2. CALL FOR AND NUMBERING OF CONTRIBUTIONS

Contributions were submitted and numbered as follows:

| Number | Document | Agenda # |
|-----------------------|-------------------------------------------|----------|
| TTY Forum/00.07.11.01 | Agenda | 3 |
| TTY Forum/00.07.11.02 | Draft TTY-14 Summary | 4 |
| TTY Forum/00.07.11.03 | TTY/TDD Solution Testing for CDMA | 10 |
| TTY Forum/00.07.11.04 | TIP1 Document (copies to be distributed) | 10 |
| TTY Forum/00.07.11.05 | 2.5 millimeter jack (verbal contribution) | 8 |

3. REVIEW & APPROVE AGENDA

The agenda was distributed

4. REVIEW & APPORVE TTY FORUM-14 SUMMARY

No corrections were noted. Any comments or corrections can be addressed to Todd Lantor or Ed Hall via e-mail.

5. CORRESPONDENCE

Ed Hall, ATIS, and Todd Lantor, PCIA, noted that they have not received any correspondence since the last forum.

6. TTY LIASON REPORTS: FCC, CTIA/PCIA, NAD, TDI

FCC- Marty Leibman noted that they are evaluating comments received regarding public notice process concerning TTY and have nothing new to report.

NAD- Not enough representatives for the meeting

CTIA- No report at this time

PCIA- Todd Lantor had no report at this time as the public notice process started in May. He noted that he had received comments from 20 representatives who filed and that participants could review those comments during break.

TDI- No report at this time

7. FCC RULEMAKING

Todd Lantor, PCIA, gave an overview on the FCC public notice for comment, released on May 17, 2000, which noted that text telephone and wireless be compatible. He noted that some issues were how long to develop and implement handsets to achieve this solution, infrastructure, and testing. Todd noted that some comments were received by manufacturers, associations, disabilities groups and carriers. Some carriers commented that implementation could take until 2002.

Todd noted that these comments could be downloaded from the FCC web site and offered to give interested participants instructions on how to download comments.

Sean Campbell, SBC, noted that we would make the TTY deadline for the FCC mandate. He noted thanks to manufacturers that helped SBC reach the FCC mandate. He further noted that the operators are not able to make any comments requiring the manufacturers to have a mandate. He noted that 2 weeks is not enough time for operators to meet the mandate and asked if other operators are concerned with not having enough time to meet the mandate. Jennifer Kohls, Sprint PCS, reiterated FCC statements and noted that carriers are reliant upon this product. She further noted that she supports Sean's comments on the two deadlines, however, noted that Sprint PCS outsources to manufacturers and are reliant upon the manufacturer to meet the mandate.

A participant noted that because CDMA standards are developed, manufactures could not automatically use those standards as a blueprint, though they feel they may be able to have a product available for the groups before the proposed deadline. Different carriers have different deadlines and it is unlikely that operators could have this product deployed by the deadline. He noted that live and interoperability testing is crucial in order to see if the date needs to be pushed out. He noted that no carrier or manufacturer has complete end-to-end control and that we have to work together in a concerted effort.

CTIA noted that a concern for them is the issue of in-field testing. Preliminary information that CTIA received caused concern whether the FCC deadline could be met. CTIA recommended that the FCC date be flexible. They also recommended that the field-testing be done so that carriers and manufacturers can work together.

Sean Campbell, noted that SBC suggested several outlines so that the FCC would be notified in order to suggest an alternate date. CTIA suggested the TTY Forum due to CTIA's view that manufacturers and carriers should try to resolve this issue. Since the TTY Forum has completed reports to the FCC, CTIA does not want the progress to be slowed by monitoring problems.

Todd noted comments received by SBC to the FCC, in which SBC proposed a 7 step monitoring reporting program that could start as early as 9/30/00. Todd noted that it is possible that TTY could provide quarterly reports to the FCC. He noted those two problems are that reporting on a quarterly basis is very frequent, and that receiving and understanding the information in that short period of time could be a hurdle. Ultimately the report would fall on the TTY co-chairs. On such sensitive matters, Todd noted that he is not sure that this forum would suit the industry's purposes.

Sean Campbell noted that if the information was sent to the forum verbatim from the manufacturers, the forum could act as a funneling device. Todd responded that he does not have a problem acting as a funneling device.

A participant asked if the information that would have to be provided is proprietary information. Ed responded that the TTY Forum was gathered to address technical issues. He noted that he feels TTY has done an excellent job in resolving technical issues, however, this forum needs to determine whether it wants to take on the administrative duty of reporting information to the FCC. In doing that, the TTY Forum's participants could change from those who want to resolve technical issues to policy makers.

Judy noted that the TTY forum has not had equal participation and wonders if this forum has the clout to bring in this kind of information. She further noted that there should be interim reporting, however, she does not want to see the forum turn into a policy regulatory group. The implementation is still technical.

Todd noted that the forum could serve an enhanced service as we are dealing with a federal mandate to meet a particular need in our society. He noted that we should work together to make this occur.

The key to making this work is information exchange. One example is that CTIA standards have particular items, but also has optional items. Perhaps this committee could hold teleconferences to include manufactures. He noted that if we could have active exchange, some companies may determine that information as proprietary, but to achieve this aggressive timeline, there needs to be more active information exchange to include testing and evaluations that could provide valuable information. Ed responded that he understands him to be saying that TTY could act as a platform to address technical issues as they arise by carriers and manufacturers. In field testing, real issues could be addressed. He responded that he feels the industry has different blueprints and manufactures have different levels of complexity.

Steve C. Erricson, noted that it is evident based on participation that we are working together on universal solutions for wireless TTY applications. The strategy side is that manufactures are competitive and the market has not been tapped into as of yet as it is proprietary. He noted that from the standpoint of participation, we look at this as a legitimate responsibility due to the FCC mandate, however it does affect business. This information received during the monitoring process could be shared with non-disclosure agreements, and if reporting is necessary, it could be done in this forum. He further noted that he did not see the FCC wanting to receive over 200 reports of redundant information. The resources are not available in the FCC to create quarterly reports. He noted that he did not see manufactures generating reports without circulating through their own legal departments, which necessitates more time for reporting. He noted that this amount of reporting could overwhelm the FCC in that respect. He noted that he is confident that manufactures are working together and are strategically putting the information in place.

Ed asked the group if they felt TTY should monitor and provide reporting. Toni NINA, noted that their primary concern is providing emergency communication for all citizens. She noted that this group has done some reporting along these lines to the FCC and feels that this group could continue to report to the FCC. She felt our role in this forum is to participate together and those who do not wish to report could be absent from those reports.

Marty FCC, noted that the SBC proposal is intriguing and they would be interested in getting reaction to SBC's proposal.

Ed noted that based on comments he has heard, the TTY Forum should keep their focus on technical issues. He further noted that at the next forum 6 months from now, the premise could be technical implementation challenges being faced by the industry. The TTY Forum will be based around contributions given regarding these challenges. He noted that the TTY Forum could identify challenges. Two months following that, the forum could request that comments be sent to the FCC. He noted that he does not think the TTY Forum should be involved in that process of comments, however it could act as a forum for discussion. He noted that TTY could meet the monitoring requirements of the FCC and keep the TTY Forum as a technical forum.

Sean noted that he feels that comments should only be filed by the party responsible in an effort to not overwhelm the FCC. When the software is then turned over to the operators, the operators could then comment. CTIA noted that if the disability community wants to participate, the FCC has to allow that.

A participant noted that the reports should be to achieve a useful purpose. The participant would like to see the forum implement something more, based on the hearing aid issue that was addressed in the past. He noted that conference calls are helpful to facilitate this information sharing process in an effort to cut down on the high costs of travel.

Steve Coston, Ericcson, noted that it is hard to bring multiple carriers and manufactures around the table and is not sure if the TTY Forum is made up of enough of the proper members to discuss the high level of technical issues for carriers to implement the TTY development. He noted that Non Disclosure Agreements would help manufactures to work together with their carriers to come up with solutions. He noted that realistically we are 17 months away from that deadline today, another 6

months to create, and 2 months to give comment on a report. He noted that there is a lot of information the carriers and manufacturers defined in the FCC public notice.

Ed noted that what he is hearing is that the TTY Forum shouldn't have any interface with implementation. Jennifer Kohls noted that over the last several forums, the mandates have been met and the standards have been developed. She would like to see this forum develop more of the operation implementation and issues surrounding ongoing operation on how to service customers. However, she agreed that individual customers could be served by Non Disclosure Agreements due to this being a competitive issue. She further noted that this forum could be broken down into workshops to address more specific concerns.

Ed noted that there is an ongoing Appendix E that is a list of requirements what should be implemented in the infrastructure and handset structure. There is no requirement for manufacturers to reach 100% of these requirements, but as many as possible should be met

Toni Dunne, NENA, noted support from the 911 community on the TTY Forum efforts. She noted that she would like to see a subcommittee established to support the field testing.

Claude Stout noted TTY Forum was established to meet the FCC mandates. He would like to see the TTY Forum focus on technological issues as well as policy issue on the side of the technological issues. He noted that there is a need to speed up the lab testing and cooperate with the FCC and 911 industry. This needs to be done before this forum discusses strategies and marketing. Claude would like to see this accomplished before the Dec. 31, 2001 deadline. It has been four years and this forum has had plenty of time to come up with the strategies and marketing.

The SBC Wireless filing noted the following dates that carriers/manufacturers should report to the FCC:

9/30/2000 – TTY Forum Standards

12/31/2000 – Network Infrastructure/TTY Forum

1/31/2001 – Report on handset development and testing plans

4/15/2001 – Midpoint report that would be filed by network infrastructure manufacturers. This report would include prototypes, consumers testing results, and beta and lab testing

7/31/2001 – Software availability

09/15/2001 – Last report by operators

12/31/2001 – Full acceptance test

SBC noted that a set schedule of report dates is needed to ensure that the deadline is met. The dates that SBC has proposed are not firmly set but a set of dates is needed in order to for the industry to meet the FCC implementation deadline.

Jennifer noted that even with an aggressive lab time, the network infrastructure needs to work, then training of the marketing personnel must be done. Training cannot be done until the product is working in the network. In regard to the proposed SBC dates, they are too frequent for manufacturers to keep up with and the market is too competitive to have reporting done in this manner.

In response, SBC noted that the dates are a representation of milestones that need to be met in order for the industry to meet the implementation deadline set by the FCC. The proposed dates can be altered, but the idea of having a set of milestones is necessary.

Jerry, FCC, noted that manufacturers and carriers could submit reports once a quarter that state either a "jeopardy" report status or a report that state the manufacturer/carrier is having no problems.

Claude noted that the product and services should be available in 2002 with the SBC proposed milestone dates. It was asked if the FCC intends for the products to be available in 2002. The

8. TECHNICAL STANDARDS ACTIVITIES UPDATE (CDMA, TDMA, IDEN GSM) UPDATE APPENDIX J

Doug Heely, noted that a few years ago, CTIA requested TIA to standardize the interconnect between all phones. This request for standardization went to TR45 and was processed to the AMPS group. Doug wrote the standard for connections and electrical levels, however, he noted that most phones have a variance of electrical levels. He noted that he had a call with the AMPS group and they are currently working on this standard. He expects to have this document completed and out for ballot in approximately 2 months. This document is called TSB -121 Project Number 4458.

Ed Hall noted that if participants had any additional updates, please send over the list serve. Ed listed the documents in Appendix J and received clarification and correction from the Forum on documents that have been sent out for ballot or have completed that ballot process. Changes will be reflected in Appendix J - Technical Standards Reference Guide. Ed noted that the next rendition of Appendix J will be accurate. All listed in appendix J are full interim standards, with the exception of PN4558. All interim standards have a shelf life of 3 years. After 3 years, they are referred to become ANSI standards. A participant noted that the IS can remain an interim standard.

9. REVIEW AND UPDATE APPENDIX K

Appendix K - Glossary of Terms.

10. VOICE BASED SOLUTIONS ("FORMERLY SHORT TERM")

(**T1P1.3 & .4 should be attached to this meeting record - get soft copies**)

T1P1.3

Bob Hall noted that the purpose of this ad hoc was to meet the US mandate first and then international mandates. Bob also noted that the solution they are working is called Cellular Text Telephone Modem (CTM). At the July 24-28 T1P1 meeting, the group will review the documents line by line and try to produce a completed document.

It was noted that it would be nice to have a low battery warning especially in a 911 situation. In response, Bob agreed but noted that the standard does not require a smart cable at this time.

TTY/TDD Solution Testing for CDMA

Jim Huntley noted that the release of the TTY/TDD Solution has been difficult to complete for numerous reasons. It will be concurrent with 2 other major VQ features, and it will support both cellular and PCS frequencies. Jim also noted that there are nearly 500 Baseline, Live and Streaming lab tests that must be completed. The DSP Code upgrade for false alarm detector contact is Dr. Steve Benno, Lucent. Jim noted that the lab tests are about 20 percent completed.

A question was also asked who will receive the results of the testing. In response, it was noted that they will be given internally at Lucent and Jim could also write a report for the TTY Forum. It was noted that Jim is unsure what steps will be taken after the test results are in.

The TTY/TDD Solution Testing for CDMA, TDMA - Schedules:

CDMA TTY: Voice Quality Testing - May - Aug. 2000
First Office Application - October 2000
General Availability - December 2000

TDMA TTY: Voice Quality Testing - Nov. 2000 - Jan. 2001

First Office Application – April 2001

General Availability – June 2001

It was asked if every switch would have to go through the same process which Lucent is going through. In response, Jim noted yes. It was noted that a carrier who has four different switch vendors would have to go through this process with each vendor.

It was asked if the reporting and updates were being provided to the TR45.3.5 group. In response, it was noted that CDMA reporting and updates are being given the TR45.3.5 group, however, no work has been done on the TDMA, therefore, no reporting and updates have been given to TR45.3.5.

It was noted that Lucent should inform the TTY Forum via the list serve when updates are needed.

It was suggested that the importance is between the interoperability testing between the handset and switch vendors.

11. DATA SOLUTION (formerly LONG TERM) NEXT MEETING

12. NEXT MEETING

Ed noted that there is a tremendous amount of work that still needs to be done. The TTY Forum needs to focus in on the coordination of vendors testing, identifying implementation issues, and sharing work plans. Ed proposed that the agenda for the next meeting should be to focus on the technology work plans that need to be completed by 12/31/01 (GSM, TDMA, CDMA, IDEN). He also proposed that the next three meetings be held 12/00, 6/01, and 12/01. Also, Ed suggested that carriers should update the FCC via the carrier's website on 3/01, 9/01, and 3/02, these dates are approximately 3 months after a TTY Forum meeting.

It was noted that forum meetings are beneficial to the manufacturers and carriers and the forum should meet more often than every six months. Also, submitting a written report to the FCC is repetitive and unnecessary.

Agreement Reached:

The TTY Forum will hold its next meeting on October 24, 2000 (second choice is October 25, 2000) at Gallaudet University. Meetings thereafter will be held on an "as needed" basis. The summary of the report from the October 2000 meeting will be formally forwarded to the FCC with a cover letter written by the Co-Chairs. Furthermore, on a voluntary effort, carrier will post a status update on their website and/or the TTY list serve on 3/01, 9/01, and 3/02.

The agenda for the next meeting will be to focus on the technology work plans that need to be completed by 12/31/01 (GSM, TDMA, CDMA, IDEN).

13. NEW BUSINESS

14. ADJOURNMENT

Ed Hall, ATIS, thanked everyone for attending and adjourned the meeting.

Exhibit N

TTY Forum

Seeking Solutions to TTY/TDD Through Wireless Digital Systems

TTY/TDD FORUM - 16

DRAFT .01

(November 28, 2000)

**November 9, 2000
ATIS Conference Center
Washington, DC**

regarding this agreement. Ed suggested that the TTY Forum starting today would receive oral reports from various industry representatives to be followed-up in a written format to be submitted to the chair. Ed will add those reports as an additional appendix (Appendix L) to the meeting summary report and submitted to the FCC.

Judy Harkins, Gallaudet University, voiced a concern that not everyone attends the TTY Forum. For this reason, there might be a limited set of reports from the industry and it wouldn't be an accurate snap shot of the true implementation status of the industry.

Andrea Williams, CTIA, noted that this is really the FCC's decision on how to handle the reporting requirements. She explained that if the FCC is going to require reporting, there is a legal process involved. She noted that at least going through the TTY Forum would provide some feedback/status update from the industry.

Sean Campbell, Cingular, explained that he believes we need more participation and that the carriers need to follow-up with their manufacturers to ensure that implementation is on track.

Al Sonnenstrahl ("Sonny"), CAN, agrees with Judy Harkins and doesn't think that having more participants will solve the problem. He noted that he thinks that the Forum needs more direction from the FCC.

Karen Peltz-Strauss, FCC noted that under Section 255 there was a parallel obligation for manufacturers to comply with TTY. She suggested that the carriers use 255 to follow-up with the manufacturers.

Lee Whritenhour, Verizon supported this and noted that all industry status reports submitted to the chair will be sent out via the list serve.

Jennifer Cole, Sprint PCS, suggested that the attendance roster be submitted along with the Meeting Summary. Ed noted that the roster is included in the meeting summary. Jennifer clarified that there should be a separate list reflecting those companies/organizations that submitted comments/reports following the TTY Forum.

Agreement Reached/Action Item: TTY Secretariat, Megan Hayes, will add a non-attending participants list of those who submit implementation status reports to the chair but were unable to attend the TTY Forum

Agreement Reached: The industry implementation status reports will be added as an appendix to the meeting summary (Appendix L). All written reports will be sent to the chair within ten working days following the forum. This agreement will be sent out the list serve to ensure that all TTY participants (past and present) are aware of the agreement. The final Meeting Summary will be submitted to the FCC and will become public record.

Related Discussions

List Serve: some participants wanted to know who was on the list serve and how to sign up. Ed noted that **Norm Williams**, Gallaudet University, is the keeper of the list serve and that those who wanted to sign up should give him their business cards. Sonny wanted to know if there was a mechanism to get in touch with the industry (manufacturers, carriers, etc.) to let them know the

results of the TTY Forum. Ed noted that as chairman of TTY Forum, he makes reports to other industry committees/forums, which have a diverse cross-section of members. Ed also noted that he receives written and oral requests for status briefings regarding TTY compliance. Judy noted that the list serve includes everyone who has attended a TTY Forum and that she believes it is the responsibility of the manufacturers to be compliant with the regulation. Ed also noted that he has spoken with CEOs and CTOs at the carriers and manufacturers who know of this regulation and are aware of established deadlines.

Karen Peltz-Strauss, FCC, noted that under Section 255 there is a directory of points of contact and that there have been hundreds of voluntary points of contact. Jessie Tannenbaum, Microsoft, expressed concern that there should be a mechanism to send feedback or acknowledgement in order to ensure that all those who have interest in the forum have the ability to participate.

Reporting: Ed brought the forum back to the specifics of the implementation report. Steve Benno, Lucent, noted that he would like to see more information from the industry than a report that everything was fine. Ed noted that even if a company gave an oral report, the TTY Forum still needs to have a written report for the meeting summary. Richard Brandt (Dick), Gallaudet University agrees with Steve, but thinks that this should be a high-level bulletized report including all aspects of compliance. Andrea Williams, CTIA, would like the FCC to answer what information is important for the required report. Doug Neeley, Nokia, wants to know if the manufacturers and carriers are currently required to report anything to anybody.

Elizabeth Lyle, FCC, noted that they have received comments from many. They are about to give recommendations to the full commission about the issues being discussed at TTY Forum. She also noted that until the commission acts, she cannot speak for them. She explained that the FCC would like an honest benchmark report on the status of implementation for the TTY regulation. She expects that the FCC doesn't want lengthy reports with unnecessary information. She noted that the Forum should play a key role in reaching closure on these issues and that if the forum is the clearinghouse for this information that we should be clear that all industry representatives have a voice.

Ed thanked Elizabeth for her comments and noted that he thought that anything longer than 2 pages is too long. Andrea noted that the purpose of these reports is to help the FCC and the consumers to know the status of compliance.

Toni Dunne, Positron Public Safety Solutions, reiterated her offer from TTY 15 to assist with coordination of the field testing with the 911 systems. She wanted to be sure that this became part of the individual company's reports.

Reporting Guidelines (detailed in contribution)

Suggested Report Criteria:

- Contains useful information and issue identification in a concise format
- High-level information, clarity and brevity are key
- Contains benchmarks for closure (i.e. action items and completion status for final implementation)

- Report significant issues that may impact compliance date

Possible Content as appropriate to reporting entity:

- TTY-compatible infrastructure and handset availability for testing (refer to consumer requirements)
- PSAP testing coordination
- Consumer end-to-end testing

8. Industry Implementation Status Reports (Also see Appendix L)

Ed Hall asked that the industry members make oral reports to the forum and follow those comments up with a written report to be added to the meeting summary.

Ericsson: Steve Coston provided a power point presentation on Ericsson's Network solution for GSM through the use of a Service Node. Copies of the slides were provided to ATIS as part of Ericsson's status report. Please see Appendix L for more detail. He noted that although Ericsson is working on all technologies, this solution presentation is specific for the GSM Networks.

Sean Campbell noted that Cingular Wireless supports this solution to the problem and is willing to work with Ericsson. Steve explained that Ericsson has demonstrated this network solution to their GSM NA customers and is also briefing them and other manufacturers with respect to the solution and the implementation roadmap.

Brye Bonner wanted to know what happened when they put TurboCode into the system. Steve answered that he does not have the data with him and cannot speak to that question.

Steve noted that they are talking about their CTM algorithm based on their designed code for TTY compatibility in the GSM technology. Steve also noted that Ericsson is addressing the roaming issues in and out of network.

Steve Benno from Lucent wanted Steve Coston to address the service node issue. Steve C. noted that they are specifically addressing this with respect to the recommended solution. Consumer 911 calls would be routed through the service node. Steve B. also wanted to know if that required users to register for the service. Ericsson answered that this "class mark" or consumer identification can be managed transparently for the consumer and that this is not a limitation of the service node. The service node would support both 911 and non-911 calls.

Lucent Technologies, P.J. Goman noted that they are moving forward with their implementation strategy. Their development is complete and they are moving toward testing. They are working with partners for CDMA and TDMA on this. The next issue is to prepare for First Office Application (FOA) process. Lucent is willing to ensure that they work with the service provide and emergency industry to test their products. There is an issue with timing for their availability because of their reliance on the handset with which they are having problems.

Jennifer Cole, Sprint PCS, wanted to know what their status is on the 1900 megahertz solution and whether there was a status on the algorithm changes. Steve answered that they found that with the Qualcomm phones there were some problems with the standards and they will be presenting another issue at the next standards meeting. The problem is with the TTY character start-up and false alarms. They haven't started their 1900 solution because they have no phone vendor for that

Andrea Williams, CTIA, commended Ultratec for offering a royalty-free license to the wireless industry.

Al Lucas, Motorola expressed a concern that this forum has worked for the past two years to develop a standardized solution that went through an expedited standards process. This solution did not include Turbo Code. He noted that suddenly coming forth with a recommendation to include Turbo Code would prove difficult for the industry, which has been working on implementing proposed and standardized solutions. Ron pointed out that this is not new and that this was discussed in previous forum discussions when the solutions were first proposed.

Peter Lee, Ameriphone, noted that they also offer a proprietary HiSpeed™ code with an on-off button. They also offer it royalty free for those who wish to use it. Sonny, CAN, wanted to know what happens if Turbo Code and high speed were compatible with each other. He also noted that TDI has been trying to set up TTY standards for 20 years to know avail. He wanted to know if it was possible for ATIS to set up TTY standards.

Dick Brandt, Gallaudet University, noted that TTY devices need to be able to intercept the "handshake" when Turbo Code is available otherwise there would be widespread garbling of information under the current solutions. Karen, FCC, wanted to know what happens when Turbo Code interacts with HiSpeed™. Answer: They are not compatible, but if a HiSpeed unit talks to a Turbo Code unit they will not connect in their high-speed mode and connect in Baudot. The issue is that whenever it tries to go into Turbo Code it causes initial garbling.

Jim Huntley, Lucent, noted that they have been doing a little bit of testing on Turbo Code and has found that if they have only one Turbo Code device, it doesn't cause a problem. If there are two Turbo Code devices, and they communicate in Turbo Code, there is significant garbling. He also noted that it far surpasses the one-percent error rate required in the "consumer requirements." He noted that when the TTYs operate in 45.5 Baud Baudot, it works fine. Gary noted that if the industry deals with Turbo Code and another proprietary code is introduced, the original solution might not work with the new code, creating a need for another fix. He suggests getting all manufacturers together to either create a singular high-speed code or create a way for interoperability. Ron noted that Ultratec has hundreds of thousands of units working, and that if the wireless digital solution doesn't work well than the current units will have problems.

Karen, FCC, noted that this is a significant problem. She also explained that the industry has to find a solution to this problem not only for TTY, but also for other regulations, 255. She suggests that the industry begin the process for standards in order to be able to meet FCC regulations. She noted that as it stands, the industry is thwarting the efforts of the FCC to provide accessibility.

Ron answered that standardization might be reasonable if Turbo Code was being supported in the wireless network, however this is the disabling of the Turbo Code handshake to prevent possible problems. Karen understands that it is not that simple if a consumer is not aware of the Turbo Code and how to turn it off, especially in an emergency situation.

Steve Benno, Lucent noted that the ITU has been very active in standardizing TTY. As the ITU goes forward with multi-media, they are concerned that the deaf and hard of hearing are not left behind. The ITU is also concerned that we are only concerned with English-language TTY. He believes that it is disappointing that we are continuing to look solely at English-only solutions.

TTY16

November 9, 2000

Washington, DC

Meeting Roster

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